NATIONAL BUREAU OF STANDARDS REPORT

3621

ISOCANDLE DISTRIBUTION OF PREPRODUCTION 100-PAR56 LAMP FOR LEAD-IN SYSTEMS

By

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U. S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

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FOR LEAD-IN SYSTEMS

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ISOCANDLE DISTRIBUTION OF PREPRODUCTION 100-PAR56 LAMP FOR LEAD-IN SYSTEMS

By R. T. Vaughan and R. W. Crouch

1. SCOPE

This report shows the isocandle distribution of two preproduction samples of the 100-PAR56 lamp, as determined from vertical candlepower distribution measurements taken at rated voltage.

2. LAMPS TESTED

The lamps tested are preproduction samples of a new lamp developed by the General Electric Company for the Airways Engineering Division of the Office of Federal Airways. They are identified by the numbers "5765-B"(over)"100W-115V" and are distinguishable from each other by a "2" and a "6" written in grease pencil on the rear surfaces of the lamps.

These lamps were specified by the Airways Engineering Division to have bulbs consisting of standard PAR56 reflectors, cover-lenses of the type used on the Navy 399-PAR lamps, and a power consumption of 100 watts at 115 volts. The voltage and power consumption were selected to meet the requirements of the CAA "lead-in" systems.

3. TEST PROCEDURE

To provide measured horizontal and vertical rotations of the test lamps, they were mounted in a special fixture on the table of a goniometer. The primary axis of rotation was horizontal and normal to the photometric axis. The line perpendicular to the vertical plane of the fixture at the center of the aperture which enclosed the lamp was taken as the axis of the lamp. The angles of the goniometer corresponding to this axis were determined by clamping a plane mirror behind the aperture of the fixture in the place normally occupied by the test lamp and then rotating the goniometer until the image of the standard lamp and its filament appeared to be in line for an observer having his eye centered with respect to the photocell. The isocandle curves have been plotted with the axis of the lamp at the origin of coordinates but the goniometer angles have been indicated to show the relationship between the figures.

The candlepower distribution was measured with an automatic photometer, the recording element of which was a Leeds & Northrup recording potentiometer driven in synchronism with the goniometer on which the lamp under test was mounted. The photometer was calibrated with standard lamp No. BS 3315 at a distance of 1.9 meters; the photometric distance was 30.0 meters (98.4 feet).

When the calibration was completed, a record was made on the candlepower distribution chart. In figure 1 this record has been marked to show the test lamp candlepower which would be equivalent at the photocell to that of the standard lamp.

All measurements were made with a 60-cycle constant voltage source adjusted to give 115 volts between the test-lamp terminals. Since total lumen ratings are not available for preproduction lamps, no correction factors were introduced for the lumen output of the test lamps.

4. RESULTS

The vertical candlepower distribution curves show a peak candlepower of approximately 2.5 kilocandles for each lamp.

The distribution of candlepower as shown in figures 2 and 3 is remarkably free from the irregularities which are usually found in curves of this type.

In the absence of total-lumen ratings, an estimate of the candlepower for an average lamp of the type tested can be made from the nominal and actual wattage of the lamps. The test lamps were operated at 96.4% (No. 2) and 96.6%(No. 6) of their rated power. Using the average of these values, 96.5%, and the formula,

$$\frac{\text{operating lumens}}{\text{rated lumens}} = \left(\frac{\text{operating watts}}{\text{rated watts}}\right)^{2.19} *$$

it is estimated that an average lamp of this type operating at 100 watts may be expected to have a candlepower in the indicated directions equal to the values shown on the isocandle curves increased by the factor 1.08.

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* General Electric Lamp Bulletin LD-1, October 1950, Page 19.

LAMP FOR LEAD-IN SYSTEM

VERTICAL CANDLEPOWER DISTRIBUTIONS AS RECORDED BY PHOTOMETER

Lamp No. 2

Calibration
3.68 KC

Lamp No.: 100-PAR
Bulb: PAR 56
Lens: Type 399 PAR 56
Rated: 100 Watts, 115 Volts

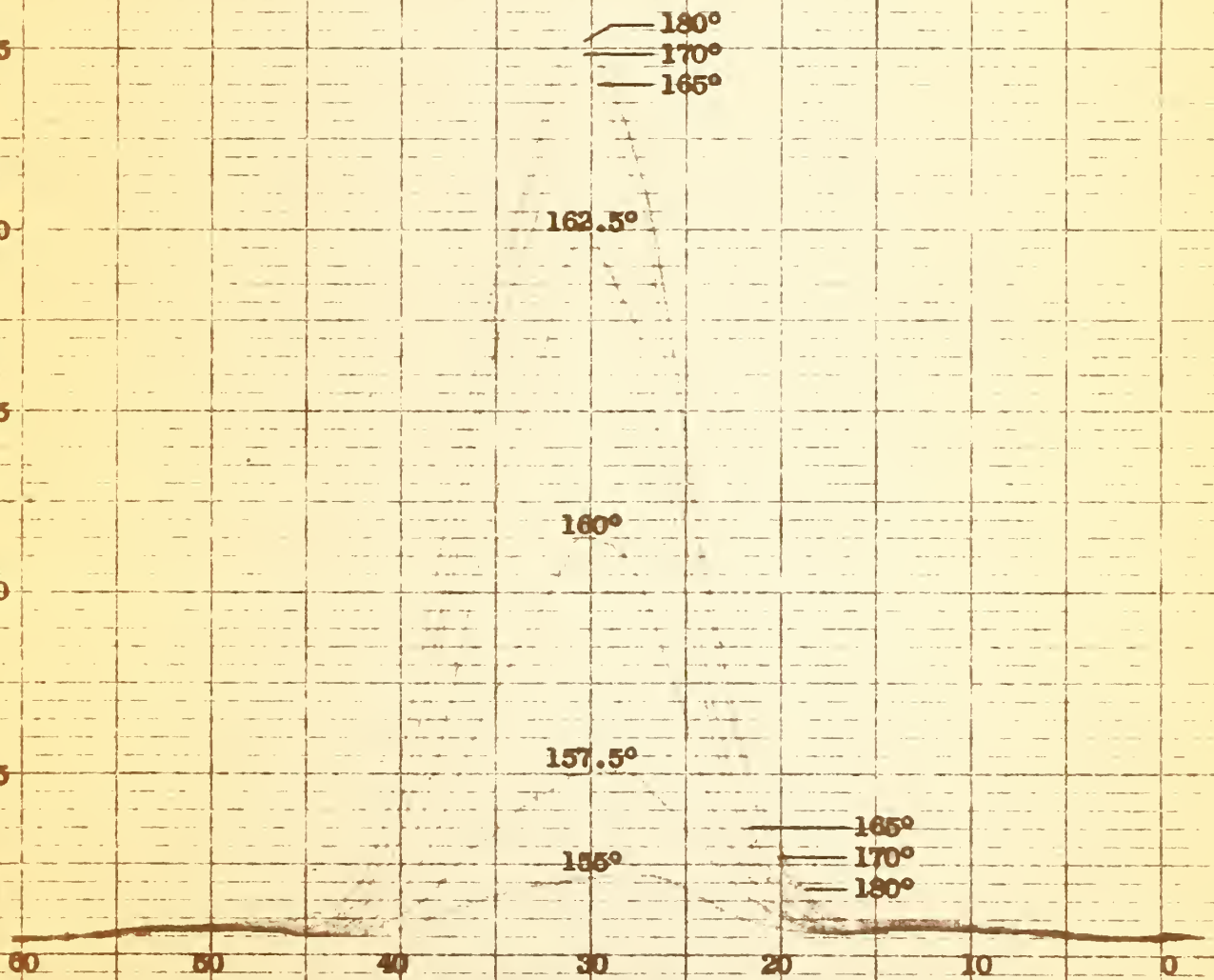

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Figure 1

LAMP FOR LEAD-IN SYSTEM

ISOCANDLE CURVES

Lamp No. 2

Lamp No.: 100-PAR
Bulb: PAR 56
Lens: Type 399 PAR 56
Rated: 100 Watts 115 Volts

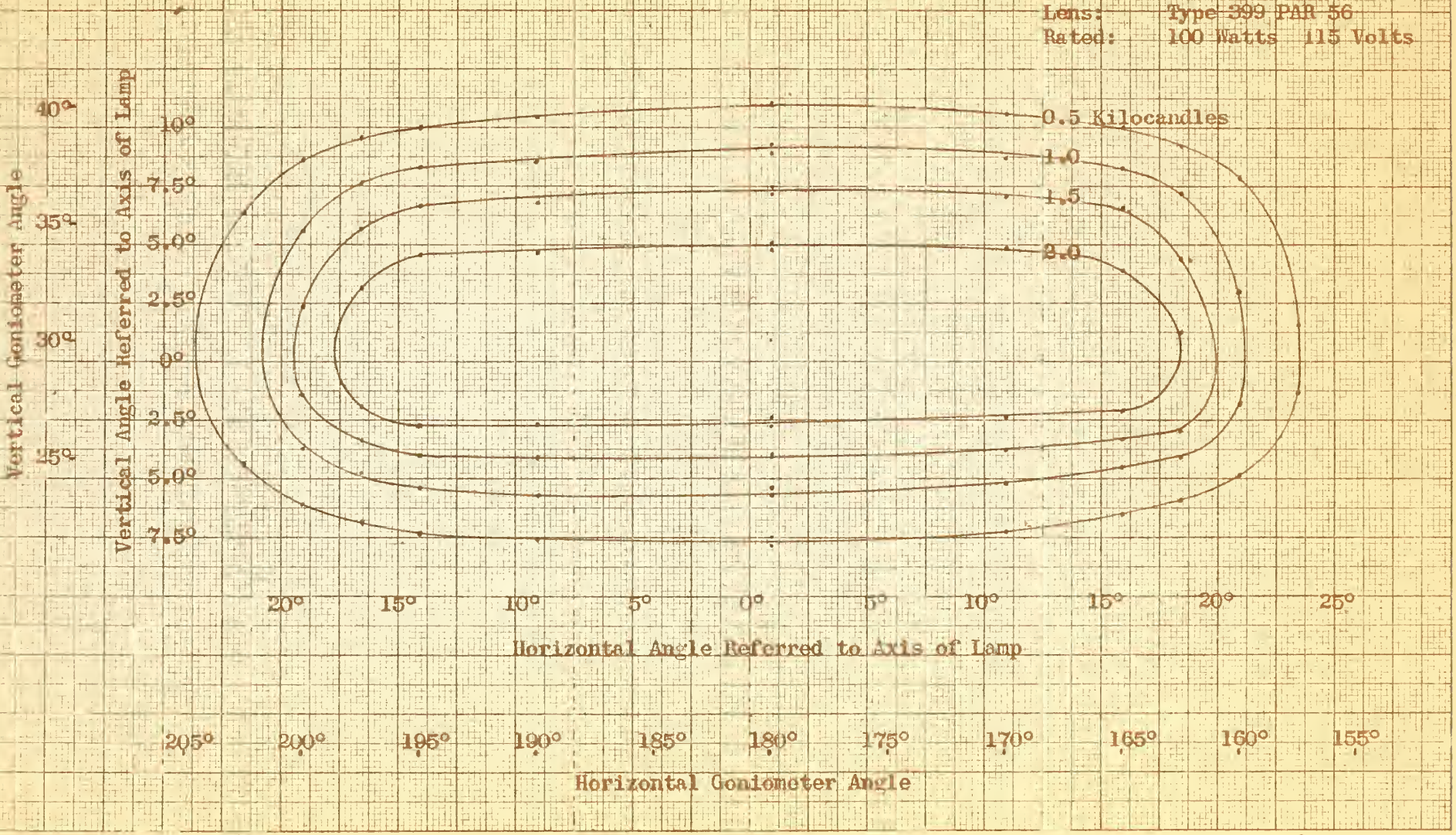

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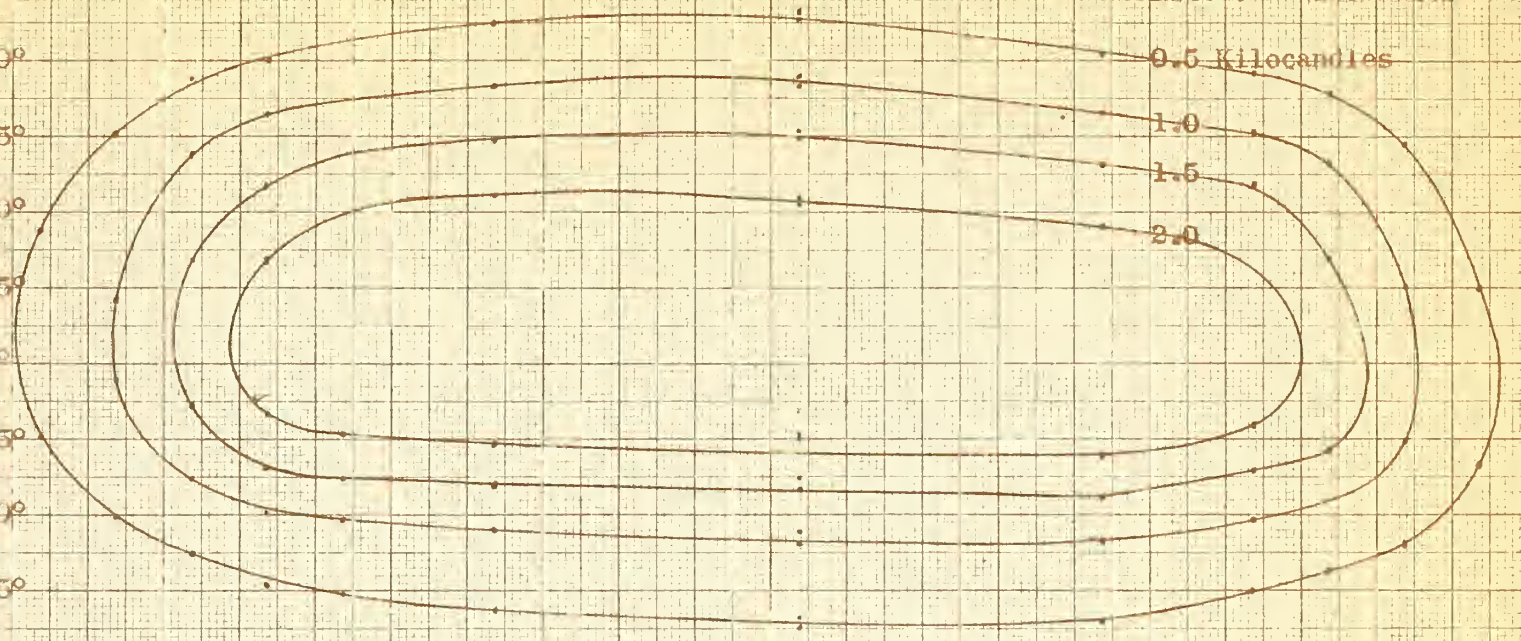
Figure 2

LAMP FOR LEAD-IN SYSTEM

ISOCANDLE CURVES

Lamp No. 6

Lamp No.: 100-PAR
Bulb: PAR 56
Lens: Type 309 PAR 56
Rated: 100 Watts 115 Volts



Vertical Goniometer Angle

Vertical Angle Referred to Axis of Lamp

40° 35° 30° 25° 20°

10° 7.5° 5.0° 2.5° 0° 2.5° 5.0° 7.5°

20° 15° 10° 5° 0° 5° 10° 15° 20° 25°

Horizontal Angle Referred to Axis of Lamp

205° 200° 195° 190° 185° 180° 175° 170° 165° 160° 155°

Horizontal Goniometer Angle

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Figure 3

THE NATIONAL BUREAU OF STANDARDS

Functions and Activities

The functions of the National Bureau of Standards are set forth in the Act of Congress, March 3, 1901, as amended by Congress in Public Law 619, 1950. These include the development and maintenance of the national standards of measurement and the provision of means and methods for making measurements consistent with these standards; the determination of physical constants and properties of materials; the development of methods and instruments for testing materials, devices, and structures; advisory services to Government Agencies on scientific and technical problems; invention and development of devices to serve special needs of the Government; and the development of standard practices, codes, and specifications. The work includes basic and applied research, development, engineering, instrumentation, testing, evaluation, calibration services, and various consultation and information services. A major portion of the Bureau's work is performed for other Government Agencies, particularly the Department of Defense and the Atomic Energy Commission. The scope of activities is suggested by the listing of divisions and sections on the inside of the front cover.

Reports and Publications

The results of the Bureau's work take the form of either actual equipment and devices or published papers and reports. Reports are issued to the sponsoring agency of a particular project or program. Published papers appear either in the Bureau's own series of publications or in the journals of professional and scientific societies. The Bureau itself publishes three monthly periodicals, available from the Government Printing Office: The Journal of Research, which presents complete papers reporting technical investigations; the Technical News Bulletin, which presents summary and preliminary reports on work in progress; and Basic Radio Propagation Predictions, which provides data for determining the best frequencies to use for radio communications throughout the world. There are also five series of nonperiodical publications: The Applied Mathematics Series, Circulars, Handbooks, Building Materials and Structures Reports, and Miscellaneous Publications.

Information on the Bureau's publications can be found in NBS Circular 460, Publications of the National Bureau of Standards ($1.00). Information on calibration services and fees can be found in NBS Circular 483, Testing by the National Bureau of Standards (25 cents). Both are available from the Government Printing Office. Inquiries regarding the Bureau's reports and publications should be addressed to the Office of Scientific Publications, National Bureau of Standards, Washington 25, D. C.


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